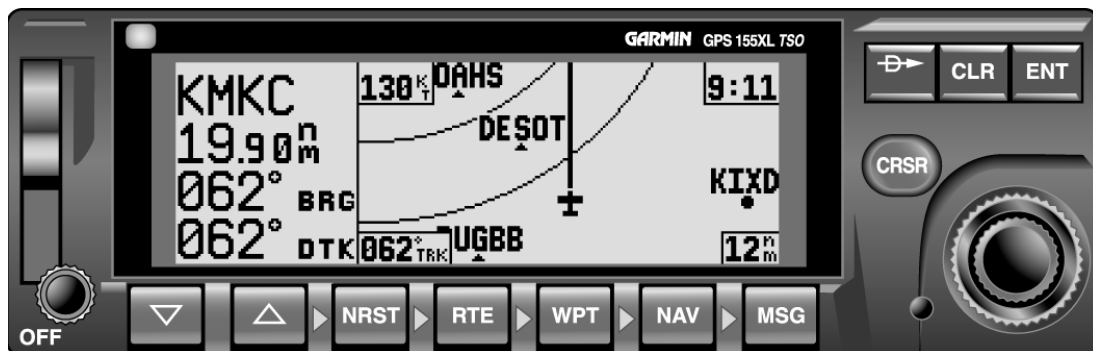




GPS 155XL MAINTENANCE MANUAL



Garmin International
1200 E. 151st Street
Olathe, KS 66062 USA

© Copyright 1999
GARMIN Corporation
All Rights Reserved

Except as expressly provided herein, no part of this manual may be reproduced, copied, transmitted, disseminated, downloaded or stored in any storage medium, for any purpose without the express prior written consent of GARMIN Corporation. GARMIN Corporation hereby grants permission to download a single copy of this manual and of any revision to this manual onto a hard drive or other electronic storage medium to be viewed and to print one copy of this manual or of any revision hereto, provided that such electronic or printed copy of this manual or revision must contain the complete text of this copyright notice and provided further that any unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

GARMIN
1200 E. 151st Street
Olathe, KS 66062 USA
Telephone: 913-397-8200
Dealer Line: 1-800-800-1420
Website Address: www.garmin.com

REVISION RECORD

REVISION	REVISION DATE	DESCRIPTION	ECO #
A	06/30/98	INITIAL RELEASE	-----
B	09/15/98	CORRECT TO/FROM FLAG VOLTAGE	9396
C	10/20/98	CORRECT TESTING PARAMETERS	9871
D	04/30/99	REDRAW	10935

TABLE OF CONTENTS

Section 1 DESCRIPTION AND OPERATION

Paragraph	Page
1.1 INTRODUCTION	1-1
1.2 GENERAL DESCRIPTION.....	1-1
1.3 DETAILED DESCRIPTION.....	1-2
1.3.1 Control Display Unit—CDU	1-3
1.3.2 Main Board Assembly	1-3
1.3.2.1 CPU Board.....	1-3
1.3.2.2 CPU Power Supply Circuits.....	1-4
1.3.3 GPS Receiver	1-5
1.3.4 Interface Board and Data Cards.....	1-6
1.3.5 Altitude Decoder Board	1-6

Section 2 SPECIAL TOOLS AND TEST EQUIPMENT

2.1 INTRODUCTION	2-1
2.2 SPECIAL TOOLS AND TEST EQUIPMENT	2-1
2.3 TEST PANEL/TEST HARNESS.....	2-1

Section 3 TROUBLESHOOTING

3.1 INTRODUCTION	3-1
3.2 TROUBLESHOOTING EQUIPMENT	3-1
3.3 SELF-TEST FAILURES	3-1
3.4 INITIAL TROUBLESHOOTING	3-3
3.4.1 Power Supply Check.....	3-3
3.4.2 Internal Clock Check.....	3-3

TABLE OF CONTENTS

(Continued)

3.5	TROUBLESHOOTING	3-6
3.5.1	Table Notes	3-7
3.6	EXTERNAL CONNECTORS	3-8
3.7	INTERCONNECT DIAGRAM	3-10

Section 4

DISASSEMBLY AND REASSEMBLY

4.1	INTRODUCTION	4-1
4.2	REQUIRED TOOLS	4-1
4.3	DISASSEMBLING THE UNIT	4-1
4.3.1	Removing the Covers	4-1
4.3.2	Control/Display Unit	4-2
4.3.3	Removing the Altitude Decoder Chassis Subassembly	4-2
4.3.4	Interface Board Removal	4-2
4.3.5	CPU Board Removal	4-3
4.3.6	GPS Receiver Assembly Removal and Disassembly	4-3
4.3.7	Power Switch Assembly Removal	4-4
4.3.8	Rotary Switch Assembly Removal	4-4
4.3.9	Display Module Assembly	4-4
4.3.10	Remote Battery Pack and Charger Disassembly	4-5
4.4	REASSEMBLY	4-5

Section 5

TESTING

5.1	INTRODUCTION	5-1
5.2	TEST EQUIPMENT	5-1
5.3	MEMORY BATTERY REPLACEMENT	5-2
5.4	TESTING	5-3
5.4.1	Test Setup	5-3
5.4.2	Test Procedure	5-3

TABLE OF CONTENTS
(Continued)

Section 6
REPLACEABLE PARTS

6.1 INTRODUCTION 6-1

Section 7
ASSEMBLY DRAWINGS

7.1 INTRODUCTION 7-1

LIST OF ILLUSTRATIONS

Figure	Page
1-1 GPS 155XL BLOCK DIAGRAM	1-2
1-2 GPS 155XL CONTROL/DISPLAY UNIT BLOCK DIAGRAM.....	1-3
1-3 GPS 155XL MAIN BOARD ASSEMBLY BLOCK DIAGRAM.....	1-4
1-4 GPS 155 XL GPS RECEIVER BLOCK DIAGRAM.....	1-5
2-1 TEST HARNESS/TEST SETUP J2.....	2-2
2-2 TEST HARNESS/TEST SETUP J1/J5.....	2-3
3-1 CPU BOARD POWER SUPPLY TEST POINTS (TOP VIEW)	3-4
3-2 CPU BOARD TEST POINTS (BOTTOM VIEW).....	3-5
3-3 GPS 155XL INTERCONNECT DIAGRAM	3-10
5-1 CDI DEFLECTION TEST PAGE	5-3
5-2 OBI TEST PAGE	5-5
5-3 I/O TEST PAGE.....	5-6
5-4 ANNUNCIATOR TEST PAGE.....	5-6
5-5 EXTERNAL SWITCHES TEST PAGE	5-7
5-6 ALTITUDE DECODER TEST PAGE	5-8
5-7 OBS SELECTED COURSE TEST PAGE	5-9
5-8 EXTERNAL POWER/BATTERY TEST PAGE	5-9
5-9 DISPLAY INTENSITY TEST PAGE	5-10
5-10 GPS RECEIVER TEST PAGE	5-10
7-1 GPS 155XL ASSEMBLY.....	7-3
7-2 GPS 155XL GPS RECEIVER ASSEMBLY	7-5
7-3 GPS 155XL MAIN CHASSIS ASSEMBLY	7-7
7-4 GPS 155XL CDU ASSEMBLY	7-9
7-5 GPS 155XL REMOTE BATTERY PACK.....	7-11

LIST OF TABLES

Table	Page
3-1 SELF-TEST FAILURES	3-2
3-2 TROUBLESHOOTING CHART.....	3-6
3-3 J1 PINOUT INFORMATION	3-8
3-4 J2 PINOUT INFORMATION.....	3-9
6-1 REPLACEABLE PARTS	6-1

SECTION 1

DESCRIPTION AND OPERATION

1.1 INTRODUCTION

This manual provides assembly-level repair information for the GARMIN GPS 155XL. If necessary, the GPS 155XL can be returned to GARMIN for all service work. Contact GARMIN at the following address for further service information:

GARMIN
1200 E. 151st Street
Olathe, KS 66062 USA
Telephone: 913-397-8200
Dealer Line: 1-800-800-1420
Website Address: www.garmin.com

1.2 GENERAL DESCRIPTION

The GPS 155XL is an aircraft rack-mounted GPS receiver that meets TSO-C129a (A1) requirements for Instrument Flight Rules (IFR) enroute, terminal, and non-precision approach operations. The unit features a 12 parallel-channel receiver for tracking up to twelve satellites simultaneously. The GPS 155XL provides Course Deviation Indication (CDI) on an 80 x 240 double supertwisted nematic (DSTN) display. The display also features automatic contrast adjustment with reverse mode. An optional, remote-mounted recharging battery is available which provides up to two hours of navigation (with screen time-out enabled) in the event of an aircraft electrical system failure.

The unit is constructed from high-quality materials and uses the latest techniques in manufacturing technology. In order to achieve the desired reliability, size and power requirements, surface mount components are used extensively. Specialized equipment and procedures are required to repair circuit boards using surface-mount components. GARMIN does not authorize the repair of GPS 155XL circuit boards. All circuit boards and assemblies for the GPS 155XL can be affordably replaced through the GARMIN board exchange program, if necessary. The following assemblies and printed circuit boards are field replaceable:

- Altitude Decoder Board—Printed circuit board which contains the altitude decoder circuits and interface circuitry.
- Display Board Assembly—Contains the LCD, backlight and display circuit boards.
- Rotary Switch Assembly—Contains dual concentric switch and its assembled wiring harness.
- Control/Display Unit—Contains bezel, buttons, lens, keypad board, light pipes, front insert, plus the LCD display assembly and rotary switch assembly.
- Main Board—Printed circuit board which contains the microprocessor, LSI, and power supply circuitry.
- GPS Receiver Assembly—A module containing the GPS receiver and high precision crystal oscillator.
- Interface Board—Printed circuit board that connects the Main Board to the front loading NavData® card.
- External Battery Pack—A module containing rechargeable cells, fuse and charging circuits.

1.3 DETAILED DESCRIPTION

Internally, the GPS 155XL is divided into six printed circuit boards:

- Main
- GPS Receiver
- Altitude Decoder
- Interface
- Display
- Keypad Circuit

Figure 1-1 shows the block diagram for the GPS 155XL.

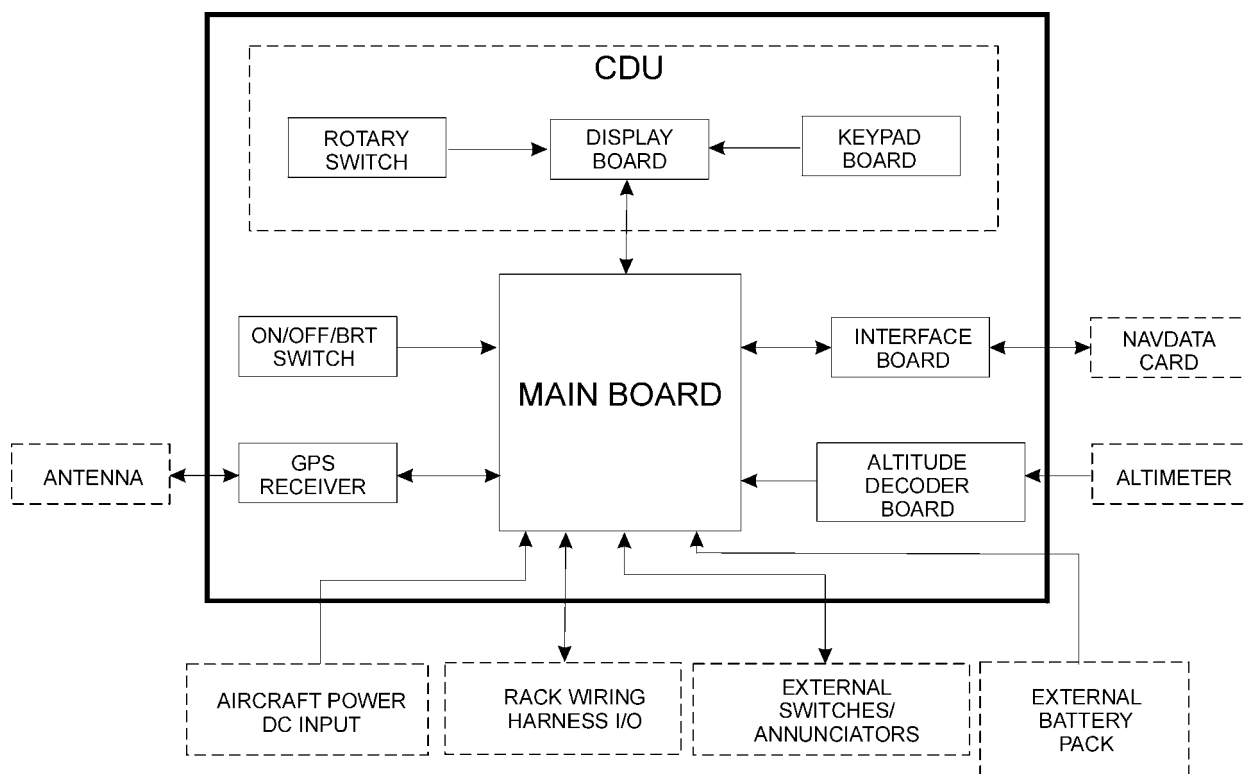


Figure 1-1. GPS 155XL Block Diagram

1.3.1 Control Display Unit

The Control/Display Unit (CDU) is an assembly consisting of eleven keycaps, keypad board, optical lens, liquid crystal display and board with heat sealed drivers, photocell and screws. All components are housed in a die cast bezel with a dual concentric rotary switch and knobs. There are two LED's behind each keycap, providing backlighting for nighttime use.

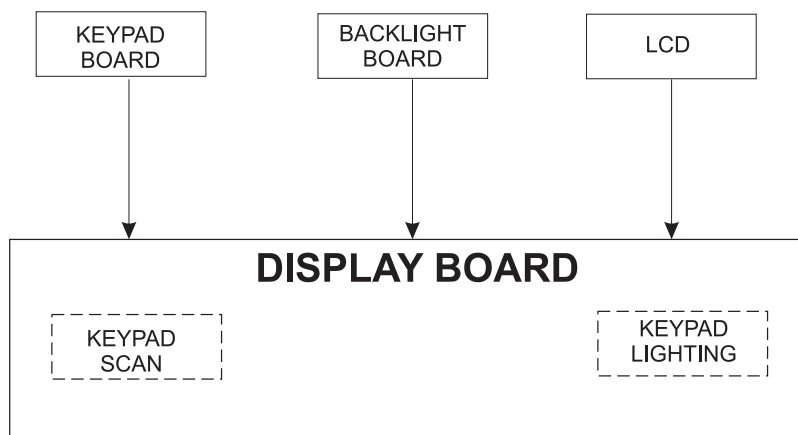


Figure 1-2. GPS 155XL Control/Display Unit Block Diagram

1.3.2 Main Board Assembly

The Main Board Assembly consists of the following:

- Central Processing Unit (CPU)
- Operating system Read-Only Memory (ROM)
- System memory
- Discrete Input/Output (I/O)
- Serial communication drivers and receivers
- Power supply

These items are discussed in detail in the following paragraphs. Figure 1-3 shows the Main Board Assembly block diagram.

1.3.2.1 CPU Board

The CPU Board is a microprocessor-based computer board. This board contains an Intel 80L186EB microprocessor running at 16 MHz, a plug-in read only memory chip (ROM) and random access memory chips (RAM). Data stored in RAM is maintained by a 3-V lithium battery when the unit is switched off and by the regulated 5-V supply when the unit is powered on. A custom large scale integrated circuit (LSI) is used to decode signals from the GPS satellites. A real time clock Integrated Circuit (IC) is used to keep track of the date and time.

Other circuits on the Main Board are used for I/O functions such as controlling the display, reading the keypad, and controlling the receiver. Discrete I/O lines are provided for CDI course deviation, CDI to/from flag, CDI NAV flag, Super Flag, external annunciators, omni bearing selector (OBS) course, and to activate the Approach mode. Serial communication lines for omni bearing indication (OBI) (clock/data/sync), ARINC 429, and RS-232 (two channels) are also included. Figure 1-3 shows the Main Board block diagram.

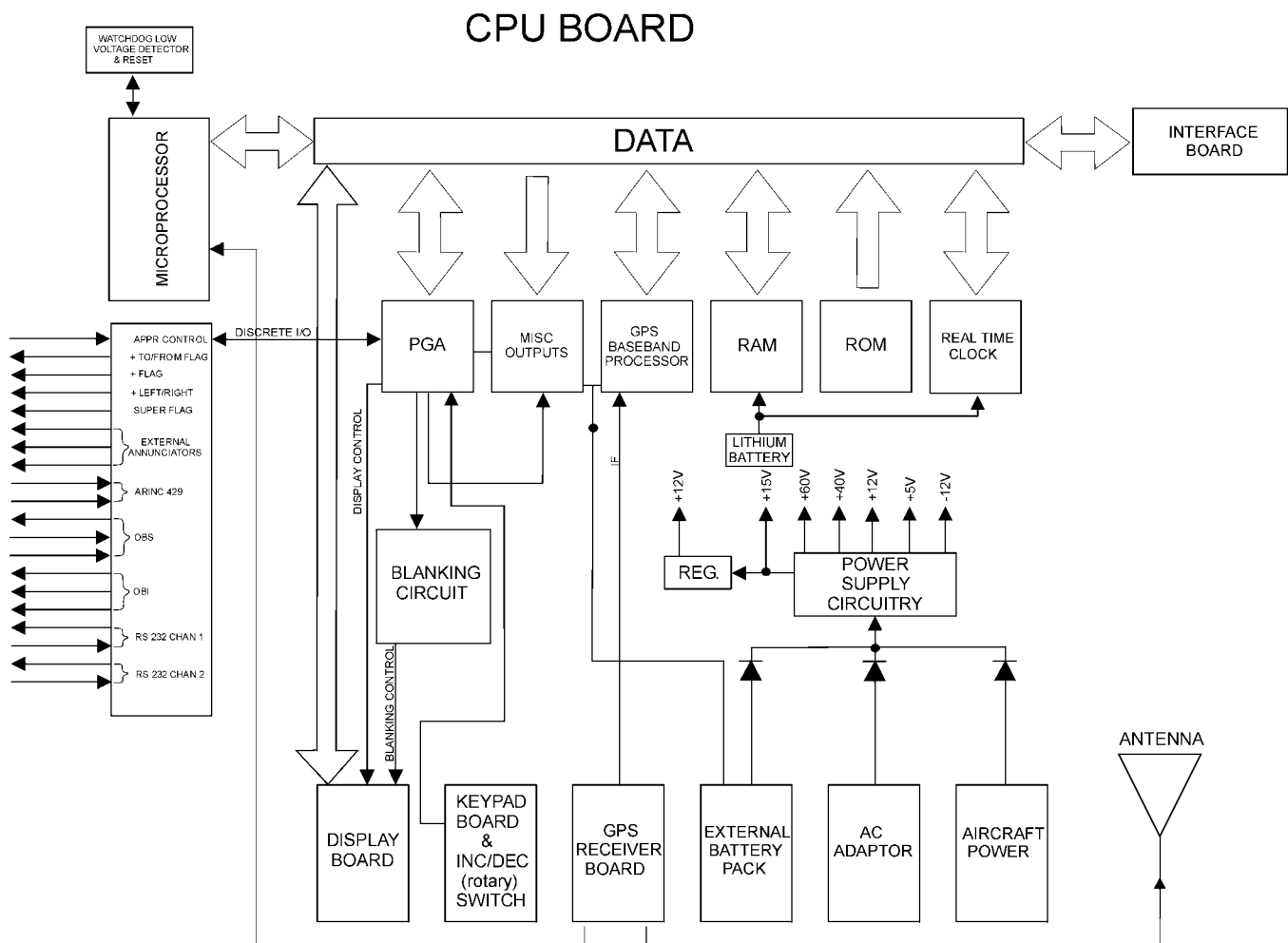


Figure 1-3. GPS 155XL Main Board Assembly Block Diagram

1.3.2.2 CPU Power Supply Circuits

The power supply section of the CPU board outputs +14 to +29 V for the LCD display, ± 12 V, +15 V, and +5 V (V_{CC}). In addition, the CPU board contains comparator circuits for detecting low Ni-Cad battery level, low memory battery voltage, and external power. The external power input is through the rear connector (J1) and from the AC adapter through a DC power jack located near the rear connector.

External battery pack power is also applied to the rear connector (J1). All of these sources are diode isolated to prevent parallel sourcing. The unit is turned on and off by a digital latch circuit operated by a knob located on the front panel adjacent to the data card opening. The switching circuit is a fly-back design and operates at a frequency of approximately 128 kHz. The +15 V output is post regulated to provide 11.75 to 12.25-V. The +5 V output is regulated at 4.8-V. All other voltages are $\pm 20\%$.

1.3.3 GPS Receiver

The GPS Receiver (Figure 1-4) consists of the following circuitry:

- Dual conversion receiver
- Frequency synthesizer
- High precision crystal oscillator
- Ceramic RF filter
- RF and IF amplifiers
- Mixers
- IF filter

The frequency synthesizer uses the high-precision oscillator as a reference frequency for the phase detector in the synthesizer. The resultant frequency is used in the mixer section to product the first intermediate frequency (IF). After further amplification and mixing with a product of the crystal oscillator, the baseband IF is passed to the CPU Board for processing. The crystal output is also used for the system clock pulse. The GPS assembly is contained within a shielding fence/cover and connection to the antenna is made via a BNC connector. The GPS supplies +5 V to the antenna's preamplifier through this BNC connector. The block diagram in Figure 1-4 shows the interaction between components on the GPS Assembly.

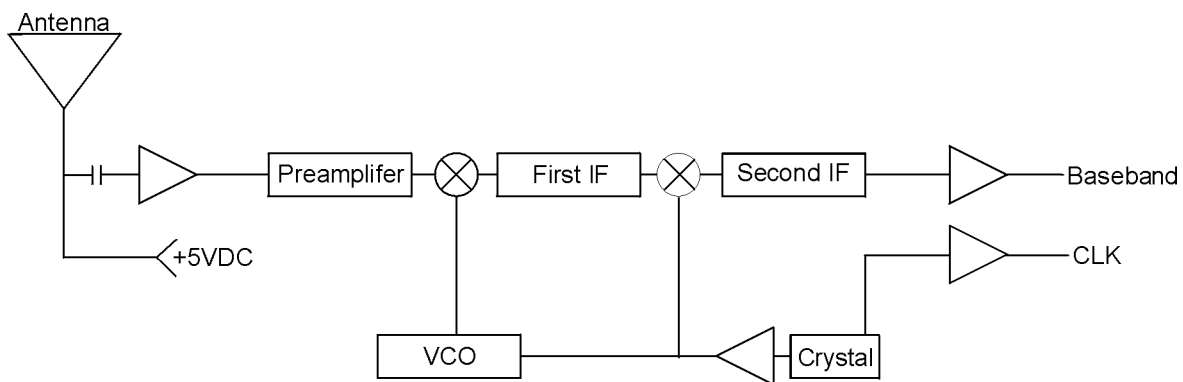


Figure 1-4. GPS 155XL GPS Receiver Block Diagram

1.3.4 Interface Board and Data Cards

NOTE

When servicing the GPS 155XL, user-defined waypoints, routes, settings, etc., may be saved on a user data card (768 kilobytes of Flash Memory; P/N 010-10032-03). Refer to the GPS 155XL Pilot's Guide for additional information on using the data card.

The Interface Board provides two-way data transfer capability between the CPU board and a Data Card. Address and data lines from the CPU board route through the Interface Board to the data card. A plastic race secures the Interface Board at the front of the unit and serves to guide the data card onto a 40-pin connector.

1.3.5 Altitude Decoder Board

The Altitude Decoder Board contains the 26-pin rear connector (J2), discrete/parallel inputs and Gillham/Greycode decoder circuitry. Encoded pressure altitude data from a parallel altimeter device is received as a 10-bit data word at the 26-pin rear connector. Diode isolation on these input lines prevents damage to the unit. The data is then decoded and output to the Main Board. The Altitude Decoder Board also provides a discrete input for the GPS SEQ switch. When grounded, this line activates the unit's HOLD mode.

SECTION 2

SPECIAL TOOLS AND TEST EQUIPMENT

2.1 INTRODUCTION

This section identifies the special tools and test equipment necessary to repair the GPS 155XL. Standard equipment is not listed. For any questions regarding special tools and test equipment, contact the GARMIN Customer Service Department listed on Page 1-1.

2.2 SPECIAL TOOLS AND TEST EQUIPMENT

- Test Harness—User Supplied
- Test Panel—User Supplied

2.3 TEST PANEL/TEST HARNESS

Test Fixtures/Test Harnesses are User Supplied. Load and signal information given in Figures 2-1 and 2-2 can aid in the fabrication of any Test Fixtures or Panels.

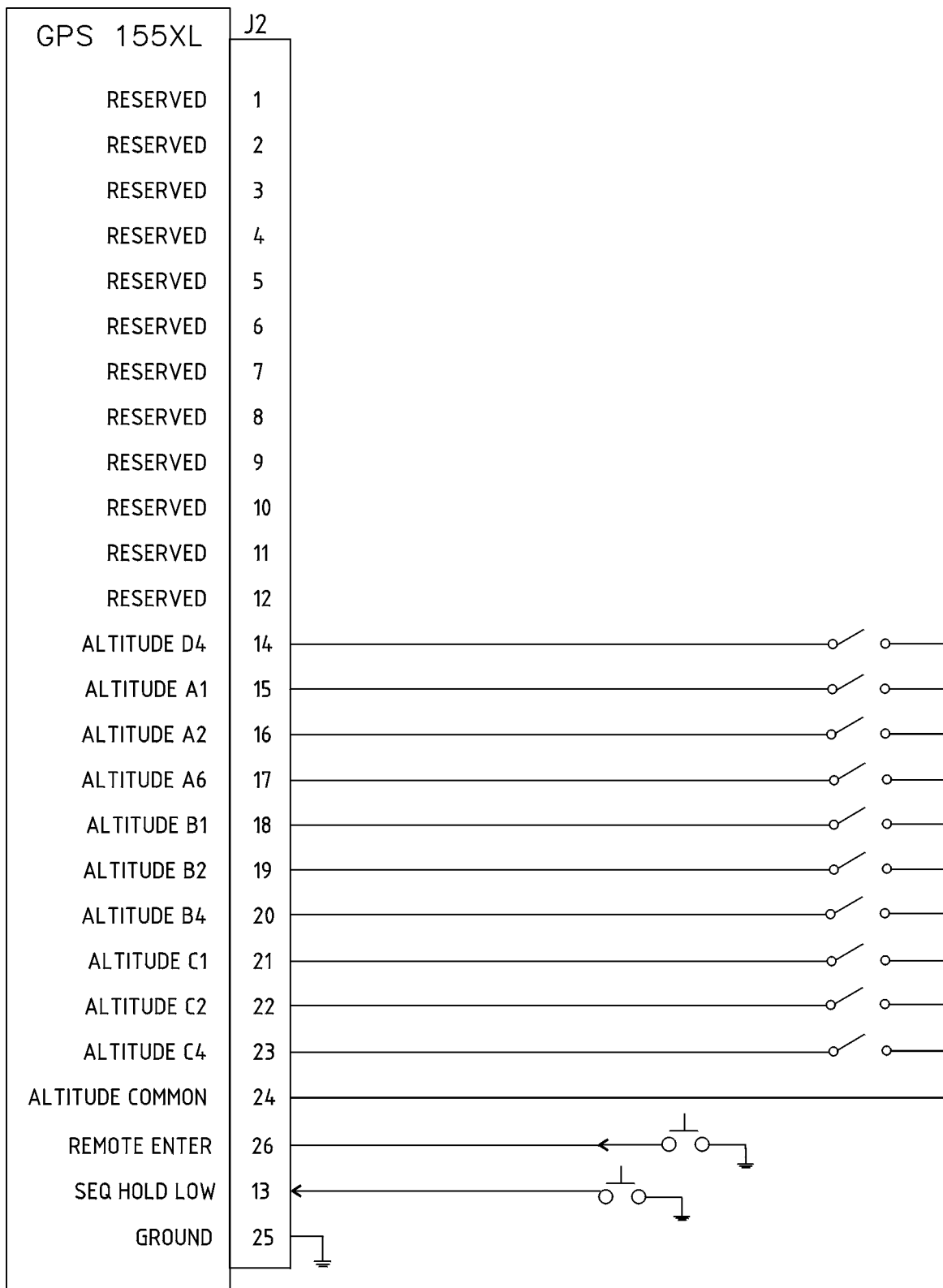


Figure 2-1. J2 Test Setup/Test Harness Diagram

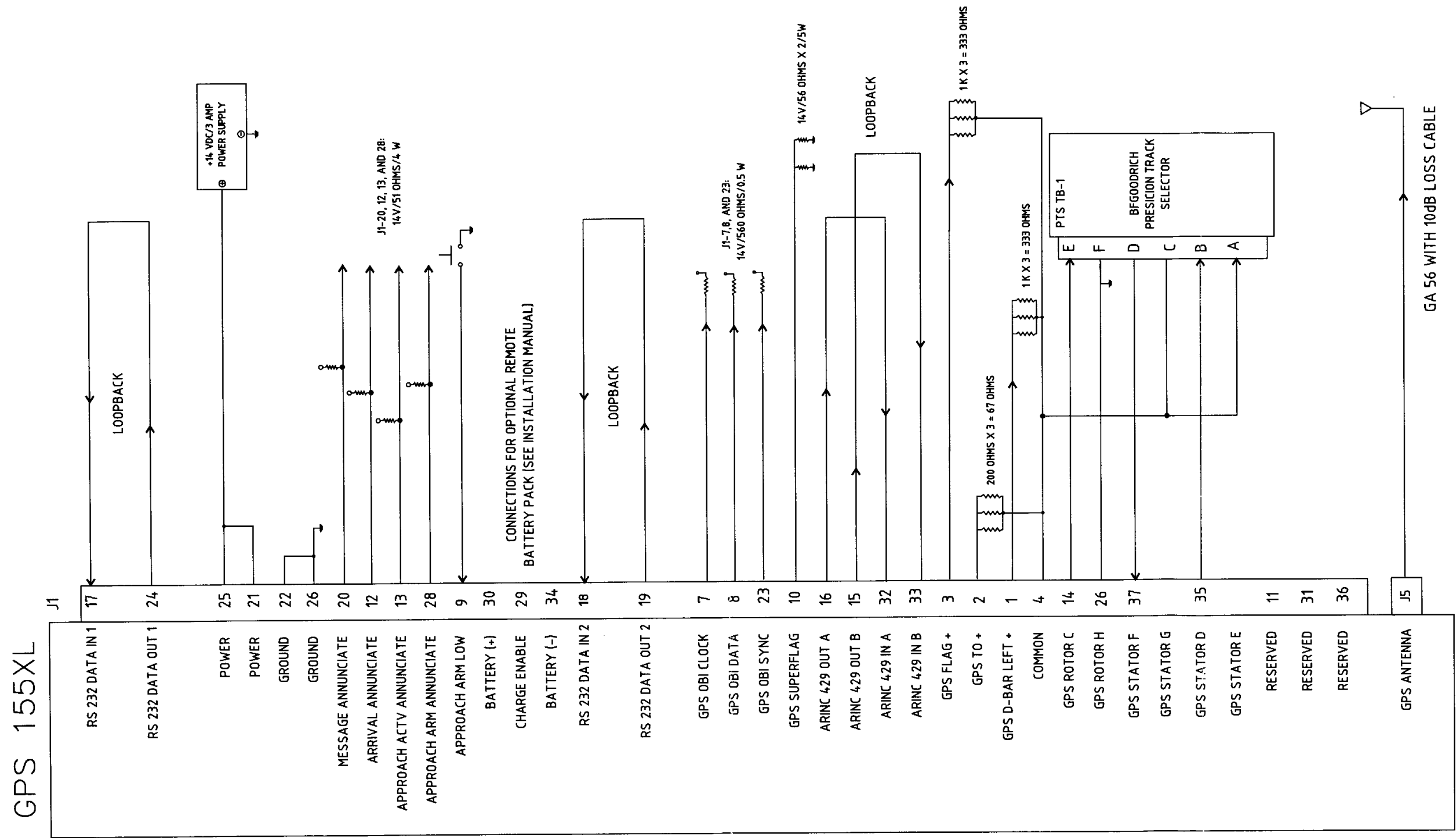


FIGURE 2-2. TEST HARNESS/TEST SETUP-J1/J5

SECTION 3

TROUBLESHOOTING



The GPS 155XL contains static sensitive components. Observe proper anti-static procedures when troubleshooting the unit.

3.1 INTRODUCTION

This section contains information to aid in troubleshooting the GPS 155XL to the assembly level.

3.2 TROUBLESHOOTING EQUIPMENT

NOTE

Test Fixtures/Test Harnesses are User Supplied. Load and signal information given in Figures 2-1 and 2-2 can aid in the fabrication of any Test Fixtures or Panels.

The following equipment (or a suitable substitute) is necessary to perform troubleshooting:

1. Power Supply Capable of 10-33 Volts @ 6 Amps
2. Digital DVM—Fluke 8000A
3. BFGoodrich Precision Track Selector
4. GPS Antenna—Garmin GA56 (P/N 010-10040-01)
5. Male to Male BNC Cable 10 $\pm$ 1dB attenuation (P/N 320-00088-00)
6. Red and Black Cables with Banana Plugs (3 ft. recommended)
7. 60 MHz Oscilloscope

3.3 SELF-TEST FAILURES

The GPS 155XL monitors many of its internal functions and displays a message to alert the user if a failure occurs. Table 3-1 shows the recommended repair for each self-test failure message. When multiple repair actions are listed, the most probable failure is listed first.

Table 3-1. Self-Test Failures

MESSAGE	RECOMMENDED REPAIR
Battery low (optional battery)	If battery/charger pack is not installed, change configuration to Remote Battery: None If battery is installed verify charge is set for 'AUTO' and allow to charge for 1 hour Verify connections to remote battery/charger pack Replace remote battery pack (see section 4.3.10)
Configuration reset	Replace CPU board (see section 4.3.5)
Data card failed	Replace NavData® card Replace interface board (see section 4.3.4) Replace CPU board (see section 4.3.5)
EEPROM write fail	Replace CPU board (see section 4.3.5)
Fuel/Air Input Failed	Check connections to fuel/air data system Replace CPU board (see section 4.3.5)
Memory battery low	Replace memory battery (see section 5.3)
Osc needs adjustment	Replace GPS receiver board (see section 4.3.6) Replace CPU board (see section 4.3.5)
Power down and re-init	Turn unit off and then back on again Verify connection between CPU board and GPS receiver board Replace GPS receiver board (see section 4.3.6) Replace CPU board (see section 4.3.5)
RAM failed	Replace CPU board (see section 4.3.5)
Receiver failed	Replace CPU board (see section 4.3.5) Replace GPS receiver board (see section 4.3.6)
Rcvr needs service	Verify connection between CPU board and GPS receiver board Replace GPS receiver board (see section 4.3.6) Replace CPU board (see section 4.3.5)
Stored data lost	Replace memory battery (see section 5.3)
Altitude Input Fail	Verify connections to Altitude Serializer/Encoder Replace Altitude Decoder Board (see section 4.3.3) Replace CPU Board (see section 4.3.5)
No Altitude Input	Replace Altitude Decoder Board (see section 4.3.3) Replace CPU Board (see section 4.3.5)

3.4 INITIAL TROUBLESHOOTING

NOTE

Remove the NavData® card before disassembling the unit.

The first step in troubleshooting the GPS 155XL is to remove the top and bottom covers (see paragraph 4.3.1). Next, verify the unit is being properly powered and the internal clock is functional.

3.4.1 Power Supply Check

1. Check the DC voltage between D511 and ground as shown in Figure 3-1. The voltage should read between -9.60 and -14.40 V. If the voltage is out of the limits specified, replace the CPU board.
2. Check the DC voltage between L502 and ground as shown in Figure 3-1. The voltage should read between 4.8 and 5.2 V. If the voltage is out of the limits specified, replace the CPU board.
3. Check the voltage between L504 and ground as shown in Figure 3-1. The voltage should read between 9.6 and 14.4 V. If the voltage is out of the specified limits replace the CPU board.
4. Check the DC voltage between Q511 and ground as shown in Figure 3-1. The voltage should read between 14 and 29 V. If the voltage is out of the specified limits replace the CPU board.
5. Check the DC voltage between D508 and ground as shown in Figure 3-2. The voltage should read between 12 and 18 V. If the voltage is out of the specified limits replace the CPU board.

3.4.2 Internal Clock Check

Check the clock speed by placing an oscilloscope probe at I101, pin 28 as shown in Figure 3-2. The frequency should be approximately 32 MHz. If the clock is not operational, replace the GPS receiver. If the clock still fails to function, replace the CPU Board.

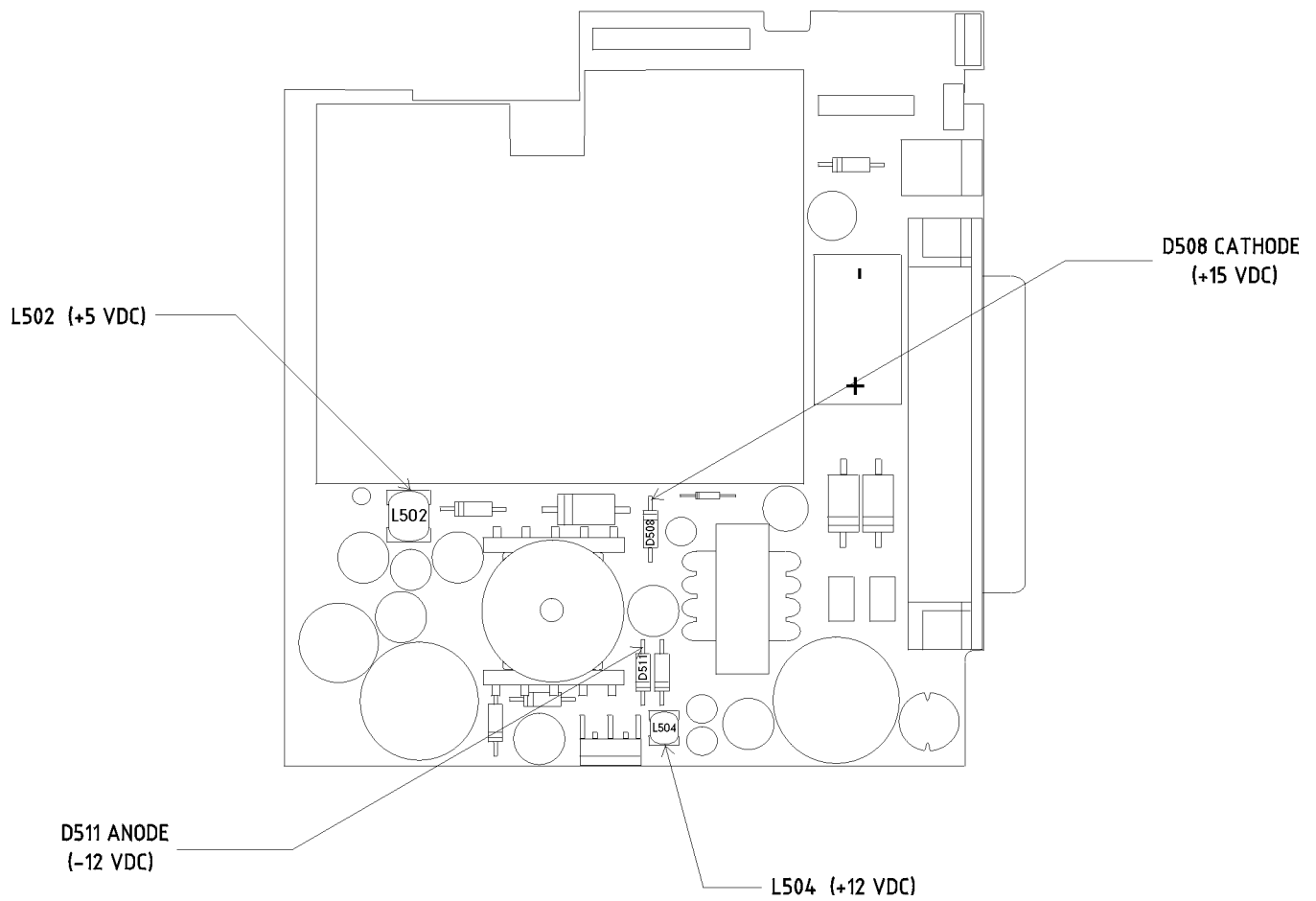


Figure 3-1. CPU Board Power Supply Test-Points (Top View)

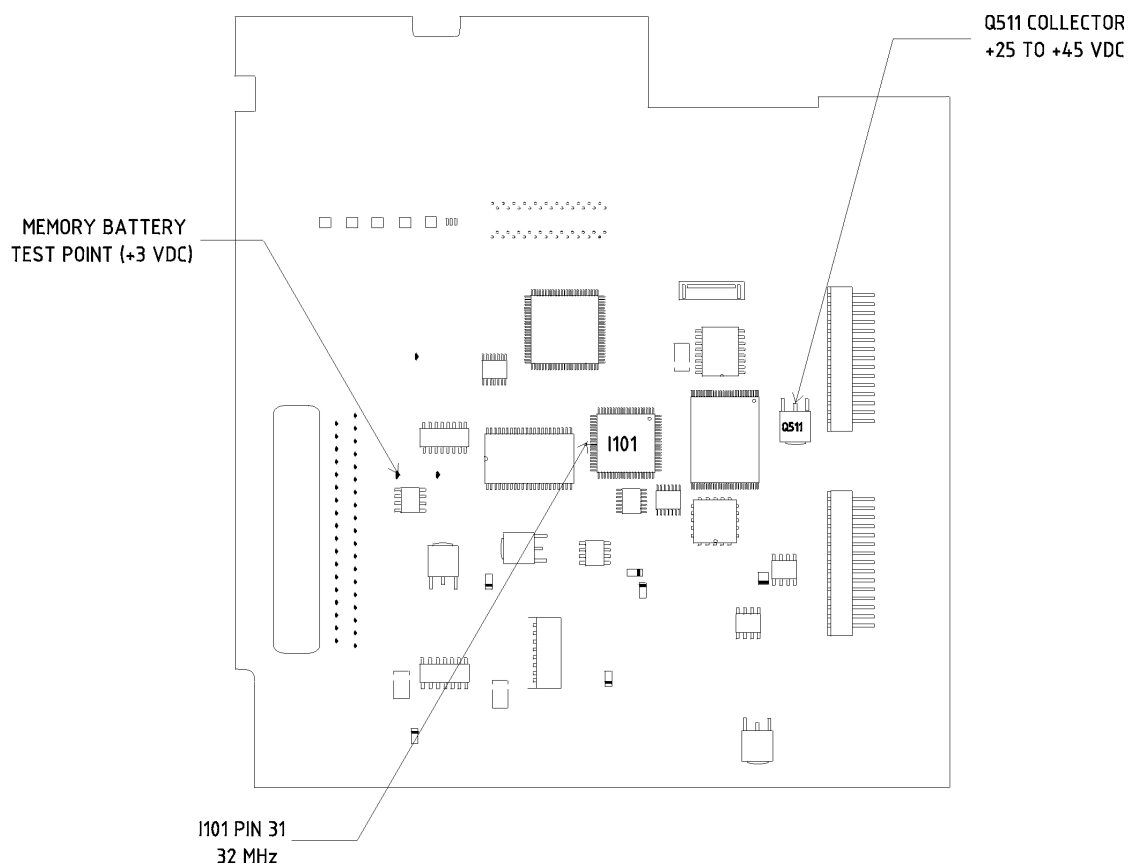


Figure 3-2. CPU Board Test-Points (Bottom View)

3.5 TROUBLESHOOTING

Table 3-2 contains problem/action information to aid in troubleshooting the GPS 155XL. Perform the actions in the sequence they are listed.

Table 3-2. Troubleshooting Chart

PROBLEM	ACTION
Unit will not power on	Check External Power Connection Check Remote External Battery Pack (if equipped) Check Power Switch Replace Power Switch (see section 4.3.7) Replace CPU Board (see section 4.3.5)
Unit will not power off	Replace CPU Board (see section 4.3.5) Replace Power Switch (see section 4.3.7)
Display has horizontal or vertical lines	Replace Display Module (see section 4.3.9) Replace CPU Board (see section 4.3.5)
Display has missing or dark pixels	Replace Display Module (see section 4.3.9)
Display brightness not adjustable manually	Replace CPU Board (see section 4.3.5) Replace Control/Display Unit (see section 4.3.2)
Display brightness not adjustable via photocell	Replace Control/Display Unit (see section 4.3.2) Replace CPU Board (see section 4.3.5)
Keycaps have no backlighting	Replace Control/Display Unit (see section 4.3.2) Replace CPU Board (see section 4.3.5)
Keycap backlighting not uniform	Replace Control/Display Unit (see section 4.3.2)
Bezel Annunciators do not function	Replace Control/Display Unit (see section 4.3.2) Replace CPU Board (see section 4.3.5)
No external annunciator output(s) (message, arrival)	Check connections and verify operation in Test Mode Replace CPU Board (see section 4.3.5)
Keycaps do not function properly	Replace Control/Display Unit (see section 4.3.2) Replace CPU Board (see section 4.3.5)
Dual concentric (rotary) knobs do not function properly	Check Flex Circuit connection from rotary switch to back of Control/Display Unit Replace Rotary Switch Assembly (see section 4.3.8) Replace Display Module (see section 4.3.9) Replace CPU Board (see section 4.3.5)

Table 3-2. Troubleshooting Chart Con't.

PROBLEM	ACTION
GPS reception weak or GPS Status Page shows low signal levels	Replace Antenna and/or antenna cable Replace GPS Receiver Board (see section 4.3.6)
No GPS reception	Check Date/Time Page for correct UTC time ¹ Check Position Page for close approximate starting position (within 300 nautical miles) ² Replace Antenna and/or antenna cable Replace GPS Receiver Board (see section 4.3.6) Replace CPU Board (see section 4.3.5)
Unit displays velocity when not moving ³	Replace GPS Receiver Board (see section 4.3.6)
NiCad Battery life is short (Optional Remote Battery)	Replace External Battery Pack (see section 4.3.10) Replace CPU Board (see section 4.3.5)
Unit loses memory in spite of new memory battery	Replace CPU Board (see section 4.3.5)
Unit does not detect low memory battery	Replace CPU Board (see section 4.3.5)
Unit does not detect external power ⁴	Check external power connection Replace CPU Board (see section 4.3.5)
No serial data output	Replace CPU Board (see section 4.3.5)
No external CDI output or external CDI functions improperly	Check connections and verify operation in Test Mode Replace CPU Board (see section 4.3.5)
Unit detects low NiCad battery too soon or too late	Adjust battery alarm setpoint from config.page

3.5.1 Table Notes

¹ If UTC time is incorrect, unit may be reset by holding the CLR key down while turning the unit on. The unit must then be attached to an antenna, allowed to search the sky and collect new almanac data. This process may take 5-10 minutes. CAUTION: All user waypoints/settings will be lost if the unit is reset, save to User Data Card.

² The GPS 155XL will eventually perform an AutoLocate™ and lock onto satellites. However, this can add an additional 10 minutes to the normal lock-on time.

³ Low velocity numbers can display even though you're not moving when the unit is in 3D mode and should not be considered a problem. However, this should seldom occur in 2D mode.

⁴ The 'Turning Off' message appears at/below approximately 9 VDC external power.

3.6 EXTERNAL CONNECTORS

The GPS 155XL provides interfaces to various General Aviation Instruments via a 37 pin connector, J1, and a 26 pin connector, J2. Tables 3-3 and 3-4 provide pinout information to aid in troubleshooting.

Table 3-3. J1 Pinout Information

J1 PIN NUMBER	PIN DEFINITION
1	D-BAR LEFT +
2	TO +
3	FLAG +
4	FLAG -, D-BAR RIGHT +, FROM +, STATOR E, STATOR G
5	RESERVED
6	RESERVED
7	OBI CLOCK
8	OBI DATA
9	APPROACH ARM LOW
10	NAV SUPER FLAG
11	RESERVED
12	ARRIVAL ANNUN
13	APPROACH ACTV ANNUN
14	ROTOR C
15	ARINC 429 OUT B
16	ARINC 429 OUT A
17	RS232 IN 1
18	RS232 IN 2
19	RS232 OUT 2
20	MESSAGE ANNUN
21	AIRCRAFT POWER (14-28 VDC)
22	GROUND
23	OBI SYNC
24	RS232 OUT 1
25	AIRCRAFT POWER (14-28 VDC)
26	GROUND
27	RESERVED
28	APPROACH ARM ANNUN
29	CHARGE ENABLE
30	BATTERY + (POSITIVE)
31	RESERVED
32	ARINC 429 IN A
33	ARINC 429 IN B
34	BATTERY - (NEGATIVE)
35	STATOR D
36	RESERVED
37	STATOR F

Table 3-4. J2 Pinout Information

J2 PIN NUMBER	PIN DEFINITION
1	RESERVED
2	RESERVED
3	RESERVED
4	RESERVED
5	RESERVED
6	RESERVED
7	RESERVED
8	RESERVED
9	RESERVED
10	RESERVED
11	RESERVED
12	RESERVED
13	SEQUENCE HOLD LOW
14	ALTITUDE D4
15	ALTITUDE A1
16	ALTITUDE A2
17	ALTITUDE A4
18	ALTITUDE B1
19	ALTITUDE B2
20	ALTITUDE B4
21	ALTITUDE C1
22	ALTITUDE C2
23	ALTITUDE C4
24	ALTITUDE COMMON
25	GROUND
26	REMOTE ENTER

3.7 INTERCONNECT DIAGRAM

Figure 3-3 shows the GPS 155XL interconnect diagram to aid in troubleshooting.

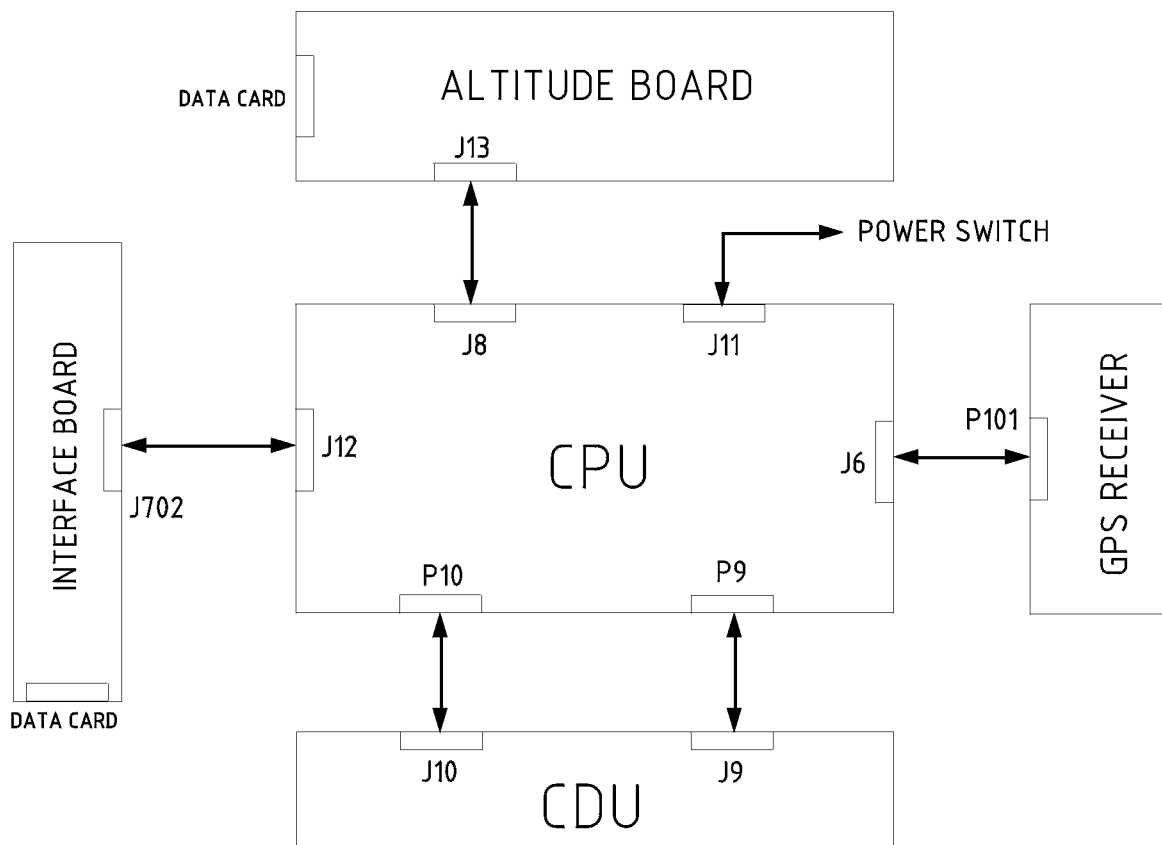


Figure 3-3. GPS 155XL Interconnect Diagram

SECTION 4

DISASSEMBLY AND REASSEMBLY



The GPS 155XL contains static sensitive components. Observe proper anti-static procedures while repairing the unit. To avoid damaging the GPS 155XL's circuit boards and assemblies, carefully follow the procedures in this section.

NOTE

Remove the NavData® card before disassembling the unit.

4.1 INTRODUCTION

This section contains the instructions for removing the major assemblies of the unit. Reassembly instructions are given in paragraph 4.4. *Disassemble the unit only to the extent necessary to remove and replace parts or assemblies. Replaceable parts and assemblies are listed in Table 6-1.*

4.2 REQUIRED TOOLS

Standard shop equipment is used to disassemble and assemble the unit.

4.3 DISASSEMBLING THE UNIT

4.3.1 Removing the Covers (Figure 7-1)

1. Remove four screws (1) securing the Top Cover (2).
2. Slide Top Cover towards the rear approximately 1/4" until the retaining lip is fully exposed. Lift off Cover.
3. Carefully turn unit over.
4. Remove two screws (3) retaining the Bottom Cover (4).
5. Slide Bottom Cover towards the rear approximately 1/4" until the retaining lip is fully exposed and remove.

4.3.2 Control/Display Unit (Figure 7-1)

1. Remove Covers (paragraph 4.3.1).
2. Remove power control knob and shaft (5) by loosening Set Screw (6) on the coupling sleeve. Retain the Shoulder Washer (7).
3. Remove four Flathead screws (8), which attach the CDU to the chassis.
4. Carefully remove the CDU from the chassis, pulling the assembly away from the two CPU board connectors and the power switch.

4.3.3 Removing the Altitude Decoder Chassis Subassembly (Figure 7-1)

1. Remove the Covers as described in paragraph 4.3.1.
2. Remove the two Screws (9), which connect the Casting (10) to the GPS Receiver.
3. Slightly loosen Screw (11). The Main Assembly can now be hinged opened by lifting up on the Casting (10) while holding the Main Assembly down. This allows troubleshooting the CPU Board without completely removing the Altitude Decoder Subassembly.
4. Remove Screw (11) and completely remove the Altitude Decoder Chassis.
5. Remove the Ribbon Cable from the J13 Connector on the Altitude Decoder and the J8 Connector on the CPU Board.
6. Remove the Altitude Decoder Board Chassis by sliding rearward approximately ¼” until the hinge slips out of the hole in the Main Chassis.

4.3.4 Interface Board Removal (Figure 7-3)

1. Remove the Covers as described in paragraph 4.3.1.
2. Remove the CDU as described in paragraph 4.3.2.
3. Remove the Altitude Decoder Subassembly as described in paragraph 4.3.3.
4. Remove the Side Casting (12) by removing the three Screws (13) and pull the casting up and out as a unit.
5. Remove the three flat head Screws (9) retaining the Data Card Race (10) and the Interface Board (11).
6. Slip the Data Card Race (10) off the Interface Board Connector (11).
7. Carefully pull the Interface Board out of the unit upward, disengaging it from the CPU Board Connector.

4.3.5 CPU Board Removal (Figure 7-3)

1. Remove covers as described in paragraph 4.3.1.
2. Remove CDU as described in paragraph 4.3.2.
3. Remove Interface Chassis Subassembly as described in paragraph 4.3.3.
4. Remove screw (1), shoulder washer (2), and insulator (3) holding the I501 Regulator to the main chassis.
5. Carefully turn the unit over.
6. The power/volume switch uses a flexible circuit cable for connection to the CPU board. This flexible circuit cable is inserted into a ZIF connector (J11). Pull up on the retaining lip of the ZIF connector and gently pull the flexible circuit cable from the connector.
7. Remove bottom shield cover from CPU Board and disconnect GPS receiver cable from connector J6.
8. Remove two flat head screws (4), which hold 37-pin DSUB connector to the main chassis.
9. Remove two screws (5) that hold CPU Board to the main chassis.
10. Carefully pull up on the CPU Board, away from the power switch.

4.3.6 GPS Receiver Assembly Removal and Disassembly (Figures 7-2, & 7-3)

1. Remove covers as described in paragraph 4.3.1.
2. Partially remove Altitude Decoder Chassis Subassembly as described in paragraph 4.3.3.
3. Remove bottom shield cover from CPU Board and disconnect GPS receiver cable from connector J6.
4. For steps 4 and 5, refer to Figure 7-3. Remove screw (1), shoulder washer (2), and insulator (3) holding I501 Regulator to main chassis.
5. Remove screw (14), and remove GPS Receiver Assembly from main chassis.
6. For steps 6-13, refer to Figure 7-2. Remove eleven screws (1) that secure GPS receiver outer cover to casting.
7. Remove four screws (2) holding GPS receiver inner cover to assembly. Lift screws out along with spacers (3).
8. Remove inner cover from assembly. Gently pry cover out if necessary.
9. Remove cable from connector J101.
10. Remove plastic screw (4) holding PC board to casting.

-
11. Unsolder BNC connector from GPS Receiver Board.
 12. To remove BNC connector from casting, remove four screws (5) from casting and pull connector out.
 13. Remove GPS Receiver Board from casting.

4.3.7 Power Switch Assembly Removal (Figure 7-3)

1. Remove Covers as described in paragraph 4.3.1.
2. Remove CDU as described in paragraph 4.3.2.
3. Remove CPU Board Sub-Assembly as described in paragraph 4.3.5.
4. Remove Coupling Sleeve (6) by removing Pivot Pin Screw (7).
5. Remove 7/16" Hex Nut (8) securing Power/Dimmer Switch to Chassis.
6. Slide Power/Dimmer Switch out of chassis mounting hole.

4.3.8 Rotary Switch Assembly Removal (Figure 7-4)

1. Remove covers as described in paragraph 4.3.1.
2. Remove CDU as described in paragraph 4.3.2.
3. Remove two Rotary Switch Knobs by loosening two Set Screws (1) on Inner Knob (2).
4. After removing Inner Knob, gently pull outer knob off Rotary Switch Shaft.
5. Disconnect Rotary Switch Wiring Harness from Connector on Display Board.
6. Remove ½" hex nut securing Rotary Switch to CDU.
7. Push rotary switch assembly out of back of Control/Display Unit.

4.3.9 Display Module Assembly Removal (Figure 7-4)

1. Remove Covers as described in paragraph 4.3.1.
2. Remove CDU as described in paragraph 4.3.2.
3. Disconnect Rotary Switch Wiring Harness from Connector on Display Board.
4. Remove four screws (3) that secure Display Board to Bezel.
5. Carefully pull Display Board away from CDU bezel, disengaging it from Keypad Board Connector.

4.3.10 Remote Battery Pack and Charger Disassembly (Figure 7-5)

1. Remove four screws (1) holding Cover to Base. Remove Cover.
2. To replace Battery Pack, disconnect the three-pin Connector J102 from Charger Circuit Board.
3. Remove Battery Pack (2) from unit.
4. To remove Charger Circuit Board Assembly (3), remove four Screws (4) holding Board to Base.
5. Remove two hex standoffs (5) holding J101 Connector to Chassis. Carefully lift charger board from Chassis.

4.4 REASSEMBLY

1. Attach the Power Switch to the Chassis by reversing the steps followed in paragraph 4.3.7. The Switch is correctly installed when the contacts and flexible circuit cable are pointed away from the Chassis frame.
2. Ensure that the Power/Volume Switch is in the 'OFF' position.
3. Attach the GPS Receiver to the Main Chassis Assembly by reversing the steps followed in paragraph 3.3.6.
4. Mount the CPU Board Subassembly on the Chassis by reversing the steps followed in paragraph 4.3.5. Be sure to pull up on the retaining lip of the ZIF Connector (J804) before inserting the flexible circuit cable.
5. Mount the Interface Board to the Chassis by reversing the steps followed in paragraph 4.3.4.
6. Install the Altitude Decoder Assembly by reversing the steps followed in paragraph 4.3.3. Carefully observe proper orientation and alignment when reconnecting the ribbon cable to the board.
7. Mount the Display Module to the CDU bezel by reversing the steps followed in paragraph 4.3.9. Be sure to reinstall the four rubber grommets before mounting the board.
8. Mount the Rotary Switch Assembly to the CDU by reversing the steps followed in paragraph 4.3.8. The Switch is correctly installed when the flex circuit soldered connection points toward the top of the unit. Torque hex nut to 25 ± 3 in oz.
9. Install the CDU by reversing the steps followed in paragraph 4.3.2. Gently slide the CDU onto the two CPU Board Connectors, observing proper pin alignment during the process.
10. Install the top and Bottom Covers by reversing the steps followed in paragraph 4.3.1.

This page intentionally left blank.

SECTION 5

TESTING

5.1 INTRODUCTION

The test procedures in this section are provided to aid the technician in locating faulty assemblies within the unit. The test procedures can be performed before troubleshooting is started or they can be used as a “return to service” test after replacements of assemblies have been made. All tests can be performed without accessing the inside of the unit.



The GPS 155XL contains static sensitive components. Observe proper anti-static procedures when testing the unit.

5.2 TEST EQUIPMENT

NOTE

Test Fixtures/Test Harnesses are User Supplied. Load and signal information given in Figures 2-1 and 2-2 can aid in the fabrication of any Test Fixtures or Panels.

The following standard equipment (or suitable substitutes) is needed to perform testing.

1. Power Supply Capable of 10-33 V @ 6 Amps
2. Digital DVM—Fluke 8000A
3. BFGoodrich Precision Track Selector
4. GPS Antenna—Garmin GA56 (P/N 010-10040-01)
5. Male to Male BNC Cable 10 $\pm$ 1 dB attenuation (P/N 320-00088-00)
6. Red and Black Cables with Banana Plugs (3 ft. recommended)
7. 60 MHz Oscilloscope

5.3 MEMORY BATTERY REPLACEMENT

The GPS 155XL uses a built-in lithium battery to maintain user waypoints/settings stored in RAM. This battery has an operational life of up to five years. Should the battery require replacement, as indicated by the 'Memory Battery Low' message, disassembly of the unit will be required to access the battery. When replacing the memory battery, all user waypoints/settings may be lost, and if this occurs, the message 'Stored Data Lost' will be displayed. The unit must then be attached to an antenna, allowed to search the sky, and collect new almanac data before it will be usable again. This process may take twenty to thirty minutes. Before beginning replacement of the memory battery, transfer all waypoints and routes to a user data card so that they may be transferred back to the unit following battery replacement. This process is described in the GPS 155XL Pilot's Guide.

1. Remove Covers as described in paragraph 4.3.1.
2. Open Altitude Chassis Subassembly.
3. Carefully turn unit over and remove the CPU Board Bottom-Side Shield Cover.
4. Remove all electrical grounds from the unit (this will prevent the battery from shorting out when using a grounded tip soldering iron).
5. Unsolder the three Battery Leads from the bottom side of the CPU Board.
6. Carefully remove the Battery by pulling it out from the top side of the CPU Board. The battery leads are welded to the battery and cannot be removed.
7. Install a new Battery and solder the leads from the bottom side of the CPU Board.
8. Turn the unit on.
9. Press ENT to accept normal mode operation.
10. Press ENT again to accept the Database Page.
11. Verify the 'Memory Battery Low' message does not appear by pressing MSG key.
12. Turn the unit off and carefully turn the unit over.
13. Verify the memory battery voltage from test point to ground is at least +2.9 V (see Figure 3-2).
14. Install the CPU Board Bottom Shield Cover.
15. Install the top and bottom covers.

5.4 TESTING

5.4.1 Test Setup

1. Before connecting a test harness to the unit, set the power supply to +13.8 VDC ± 0.1 V at J1-25, and set current limiter to 3A.
2. Turn power supply OFF.
3. Connect a test harness (figures 2-1 and 2-2) to the unit and turn the power supply ON.

5.4.2 Test Procedure

Test Mode Activation/Display Test

1. Enter the test mode by holding down the ENT key and rotating the Power Knob clockwise. The unit should display four test patterns. The first pattern turns on all pixels and shows a light background. The second pattern turns off all pixels and shows a dark background. The third pattern turns on every other pixel and shows a checkerboard pattern. The fourth pattern turns on every third pixel and shows a diagonal stripe pattern.
2. Observe the test patterns and verify the display and backlighting are working properly.

CDI Deflection Test

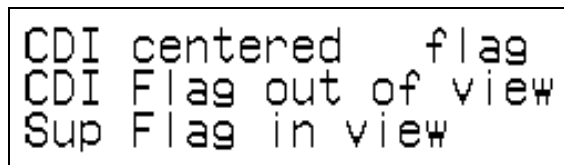


Figure 5-1. CDI Deflection Test Page

1. Rotate the outer function knob clockwise until the CDI Test Page is displayed (Figure 5-1).
2. Measure voltage across J1-1 and J1-4. Press the CRSR key once.
3. If necessary, rotate the inner function knob to select CENTERED. Verify the DMM voltage is 0 ± 15 mV.
4. Rotate the inner function knob clockwise to select FULL RIGHT. Verify the DMM voltage is -150 ± 15 mV.
5. Rotate the inner function knob clockwise to select MAX RIGHT. Verify the DMM voltage is -300 ± 30 mV.
6. Rotate the inner function knob clockwise to select MAX LEFT. Verify the DMM voltage is $+300 \pm 30$ mV.

-
7. Rotate the inner function knob clockwise to select FULL LEFT. Verify the DMM voltage is $+150 \pm 15$ mV.

CDI To/From Flag Test

1. Rotate the outer function knob clockwise.
2. Measure voltage across J1-2 and J1-4.
3. If necessary, rotate the inner function knob to select FLAG. Verify the DMM voltage is 0 ± 15 mV.
4. Rotate the inner function knob clockwise to select FROM. Verify the DMM voltage is -83 ± 20 mV.
Note: If the unit is equipped with Mod Status 1, the FROM voltage should be -190 ± 40 mV at full-scale deflection. The TO voltage should be $+190 \pm 40$ mV at full-scale deflection.
5. Rotate the inner function knob clockwise to select TO. Verify the DMM voltage is $+83 \pm 20$ mV.

CDI Nav Flag Test

1. Rotate the outer function knob clockwise.
2. Measure voltage across J1-3 and J1-4.
3. If necessary, rotate the inner function knob to select IN VIEW. Verify the DMM voltage is 0 ± 25 mV.
4. Rotate the inner function knob clockwise to select OUT OF VIEW. Verify the DMM voltage is 375 ± 80 mV.

Super Flag Output Test

1. Rotate the outer function knob clockwise.
2. Measure voltage across J1-10 and J1-22.
3. If necessary, rotate the inner function knob to select IN VIEW. Verify the DMM voltage is less than 250 mV.
4. Rotate the inner function knob clockwise to select OUT OF VIEW. Verify the DMM voltage is greater than 12.8 V.

OBI Output Test

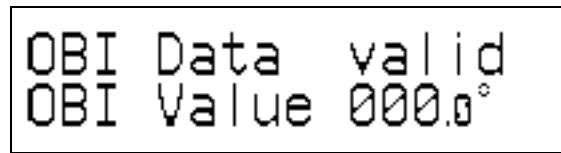
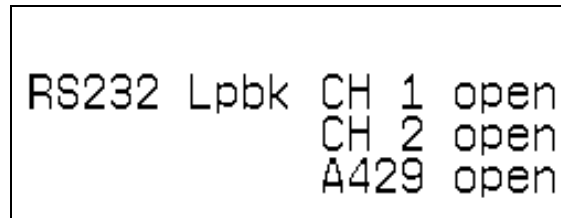


Figure 5-2. OBI Test Page

1. Press the CRSR key.
2. Rotate the outer function knob clockwise until the OBI Test Page is displayed (Figure 5-2).
3. Press the CRSR key once.
4. Rotate the outer function knob clockwise until VALUE is selected.
5. Rotate the inner function knob clockwise to select CLOCK.
6. Measure voltage across J1-7 and J1-22.
7. Rotate the outer function knob clockwise until LOW is selected. Verify the DMM voltage is less than 1.0 VDC.
8. Rotate the inner function knob to select HIGH. Verify the DMM voltage is greater than 4.5 VDC.
9. Rotate the outer function knob counterclockwise until CLOCK is selected.
10. Rotate the inner function knob clockwise to select DATA.
11. Measure voltage across J1-8 and J1-22.
12. Rotate the outer function knob clockwise until LOW is selected. Verify the DMM voltage is less than 1.0 VDC.
13. Rotate the inner function knob to select HIGH. Verify the DMM voltage is greater than 4.5 VDC.
14. Rotate the outer function knob counterclockwise until DATA is selected.
15. Rotate the inner function knob clockwise to select SYNC.
16. Measure voltage across J1-23 and J1-22.
17. Rotate the outer function knob clockwise until LOW is selected. Verify the DMM voltage is less than 1.0 VDC.
18. Rotate the inner function knob to select HIGH. Verify the DMM voltage is greater than 4.5 VDC.

RS-232 / ARINC 429 Loopback Tests

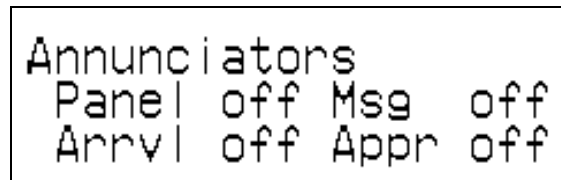
A monospaced text display showing the results of an I/O test. The text is arranged in three lines: 'RS232 Lpbk CH 1 open', 'CH 2 open', and 'A429 open'.

```
RS232 Lpbk CH 1 open
              CH 2 open
              A429 open
```

Figure 5-3. I/O Test Page

1. Press the CRSR key.
2. Rotate the outer function knob until the I/O Test Page is displayed (Figure 5-3).
3. Verify the I/O Test Page indicates 'CH 1 OK' and 'CH 2 OK.'
4. Verify the I/O Test Page indicates 'A429 OK.'

Annunciator Output Test

A monospaced text display showing the status of annunciators. The text is arranged in three lines: 'Annunciators', 'Panel off Msg off', and 'Arrvl off Appr off'.

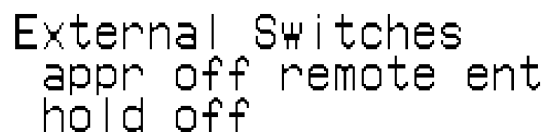
```
Annunciators
Panel off Msg off
Arrvl off Appr off
```

Figure 5-4. Annunciator Test Page

1. Press the CRSR key.
2. Rotate the outer function knob until the Annunciator Test Page is displayed (Figure 5-4).
3. Press the CRSR key once.
4. Rotate the inner function knob to turn the front panel annunciators ON. Verify that all five annunciators on the GPS 155XL are illuminated.
5. Rotate the inner knob to turn the front panel annunciators OFF. Verify that all five annunciators on the GPS 155XL are off.
6. Measure voltage across J1-20 and J1-22.
7. Rotate the outer function knob clockwise to select the MSG annunciator.

-
8. With the MSG annunciator OFF, verify the DMM voltage is greater than 4.5 VDC.
 9. Rotate the inner function knob to turn the MSG annunciator ON. Verify the DMM voltage is less than 0.3 VDC.
 10. Measure voltage across J1-12 and J1-22.
 11. Rotate the outer function knob clockwise to select the ARRVL annunciator test.
 12. With the ARRVL annunciator OFF, verify the DMM voltage is greater than 4.5 VDC.
 13. Rotate the inner function knob to turn the ARRVL annunciator ON. Verify the DMM voltage is less than 0.3 VDC.
 14. Measure voltage across J1-28 and J1-22.
 15. Rotate the outer function knob clockwise to select the APPR annunciator test.
 16. With the Appr annunciator off, verify the DMM voltage is greater than 4.5 VDC.
 17. Rotate the inner function knob to turn the Appr annunciator to ACTV. Measuring across J1-13 and J1-22, verify the DMM voltage is less than 0.3 VDC.
 18. Rotate the inner function knob to turn the Appr annunciator arm. Verify the DMM voltage is greater than 4.5 VDC.
 19. Measure voltage across J1-9 and J1-22.
 20. Verify the DMM voltage is less than 0.3 VDC.
 21. Rotate the inner function knob to turn the Appr annunciator to off. Verify the DMM voltage is greater than 4.5 VDC.
 22. Rotate the inner knob to select 'appr actv'. Verify the DMM voltage is greater than 4.5 VDC.

External Switches Test



```
External Switches
appr off remote ent
hold off
```

Figure 5-5. External Switches Test Page

1. Press the CRSR key.
2. Rotate the outer function knob until the External Switches Test Page is displayed (Figure 5-5).
3. Activate APPR SELECT (J1-9). The External Switches Test Page should display 'APPR ON.'
4. Deactivate APPR SELECT (J1-9). The External Switches Test Page should display 'APPR OFF.'
5. Activate OBS HOLD (J2-13). The External Switches Test Page should display 'HOLD ON.'
6. Deactivate OBS HOLD (J2-13). The External Switches Test Page should display 'HOLD OFF.'
7. Activate the remote enter position. The External Switches test page should display 'REMOTE ENT ON'.
8. Deactivate the remote enter position. The External Switches test page should display 'REMOTE ENT OFF'.

Altitude Decoder Test

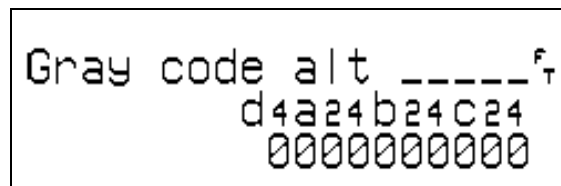
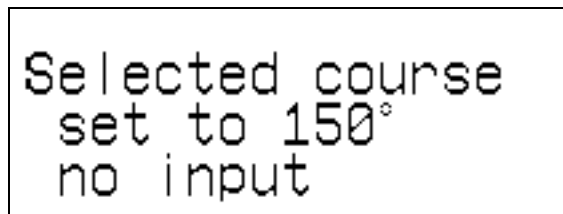


Figure 5-6. Altitude Decoder Test Page

This test exercises each altitude data line individually. Most altitude codes presented will be invalid; however, input line C1 valid (J2-21) and input line C2 valid (J2-22) indicate altitude readings of -800 and -1000 feet, respectively.

1. Rotate the outer function knob until the Altitude Decoder Test Page is displayed (Figure 5-6).
2. Activate input line D4. Verify that D4 on the Altitude Decoder Test Page indicates '1'. All other altitude inputs should still indicate '0'.
3. Continue to step through input lines A1, A2, A4, B1, B2, B4, C1, C2, and C4. Verify that only one input line (A1, A2, A4, B1, B2, B4, C1, C2, or C4) indicates '1' for each switch position. All other altitude inputs should still indicate '0'.

OBS Selected Course Test

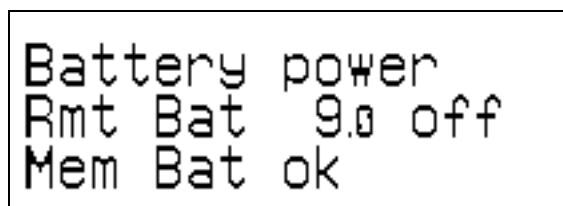


```
Selected course
set to 150°
no input
```

Figure 5-7. OBS Selected Course Test Page

1. Rotate the outer function knob until the OBS Selected Course Test Page is displayed (Figure 5-7).
2. Attach OBS Signals to respective pins on Precision Track Selector. Set Track Selector to 150°. Verify that the input course is $150^\circ \pm 9^\circ$ and “CALIB?” appears in the lower right corner of the test page.
3. Press the CRSR key.
4. Press the ENT key on the GPS 155XL to calibrate the unit. There will be a brief delay while the unit performs the calibration. Verify that the input course is now $150^\circ \pm 0.2^\circ$.
5. Attach OBS Signals to respective pins on Precision Track Selector. Set Track Selector to 60°, 240°, and 330°. Verify that in each instance the input course is within $\pm 2^\circ$.

External Power and Battery Tests



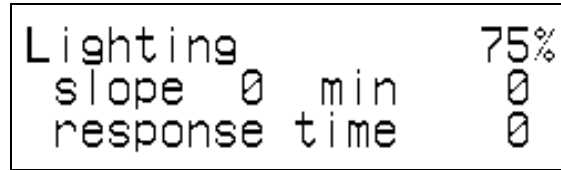
```
Battery power
Rmt Bat 9.0 off
Mem Bat ok
```

Figure 5-8. External Power/Battery Test Page

1. Rotate the outer function knob counter-clockwise until the External Power/Battery test page is displayed (Figure 5-8).
2. Verify that line two of the display indicates “External Power” and the voltage reading is approximately 13.8 ± 0.3 VDC.
3. Connect the wall charger to the unit and verify that line two of the display now indicates ‘Wall adapter.’
4. Unplug the wall adapter. Line two of the display should go back to indicating ‘External Power.’

5. Verify that line 2 of the display indicates 'Rmt Pak none.'
6. Verify that line 3 of the display indicates 'Mem Bat OK.'

Display Intensity Test

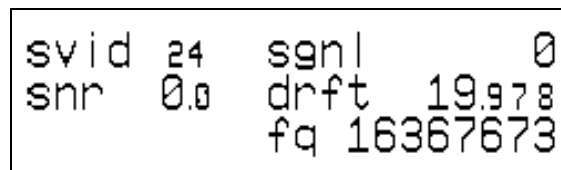


Lighting	75%
slope 0 min	0
response time	0

Figure 5-9. Display Intensity Test Page

1. Rotate the outer control knob until the Display Intensity Test Page is displayed (Figure 5-9).
2. Cover the photo diode detector on the display with a finger and verify the display intensity percentage number decreases and the display grows dimmer.

GPS Receiver Noise Test



svid 24	sgnl 0
snr 0.0	drft 19.978
	fq 16367673

Figure 5-10. GPS Receiver Test Page

1. Depress the ENT key while powering up the unit and put the unit into test mode.
2. Rotate the outer function knob until the following Receiver Test Page is displayed (Figure 5-10).
3. Terminate the GPS receiver's antenna connection into a 50-ohm load.
4. The "sgnl" number represents the receiver noise level. Verify this number is between 1450 and 1750.

Functional Test

1. Turn the unit off.
2. Insert a Jeppesen NavData® card.
3. Turn the unit on without entering test mode. Verify the unit passes its self-test. A failure is indicated by one of the messages listed in Table 3-1.
4. Verify the GPS 155XL correctly reads the NavData® card and indicates the type, effective date and expiration date.
5. Press the ENT key and verify the Satellite Status Page is displayed.
6. Press the MSG key and verify the Message Page is displayed.
7. Press the Direct To key and verify the GO TO Page is displayed.
8. Rotate the inner function knob to select a letter or number on the display.
9. Press the CLR key and verify the selected letter/number disappears.
10. Press the NRST key. Verify a Nearest Waypoint Page is displayed.
11. Press the RTE key. Verify a Route Page is displayed and the annunciator next to the RTE key is on.
12. Press the WPT key. Verify the Select Waypoint Type Page is displayed and the annunciator next to the WPT key is on.
13. Press the CRSR key and verify APT? is selected.
14. Rotate the outer function knob clockwise and verify VOR? Is selected.
15. Press the NAV key. Verify a Navigation Page is displayed.
16. Turn the unit off.

Satellite Tracking Test

The Satellite Tracking Test ensures that the GPS 155XL has current almanac information and is able to lock onto a sufficient number of satellites to provide a position. This test also verifies that the signal strength of the satellites received is at an acceptable level.

1. Turn the unit off.
2. Connect the unit to a GA56 antenna with coaxial cable having a 10 ± 1 dB loss @ 1.5 GHz. Mount antenna outside with a clear view of the sky. Attenuation pads must not be used, the unit supplies the GA56 with DC power.
3. Turn the unit on and go to the Satellite Data Page (see pilot's guide for instructions).

Allow the unit to lock onto satellites. If the unit has current almanac data, it will list the visible satellites on the row labeled SAT and will begin acquiring satellites in a period of a few minutes. If the unit indicates SEARCH SKY instead of ACQUIRING, it must search the sky for available satellites and collect almanac data. A 'search the sky' operation may take twenty to thirty minutes to complete. The unit must enter 3D navigation mode.

The unit must display the following:

1. Satellites with signal strength 3 or greater.
2. The average signal strength on satellites above 20° elevation shall be greater than or equal to 3.5 (see pilot's guide for instructions). Satellites that are acquiring should not be included in the average signal strength calculation.

SECTION 6

REPLACEABLE PARTS

6.1 INTRODUCTION

Table 6-1 list assemblies and parts of the GPS 155XL that may be replaced (ordered from GARMIN).

Table 6-1. Replaceable Parts

PART NUMBER	PART
010-10032-03	User Data Card
010-10074-00	Battery Pack, 9.6V Nicad
011-00107-04	Svce,CDU,GPS155XL
011-00108-10	Sub-Assy,Alternate Chassis
011-00183-01	Svce, GNC GPS Rcvr, N Channel
011-00230-00	Sub-Assy, Pwr/Vol Sw w/Flex Ckt
011-00231-00	Sub-Assy, Rtry Sw w/Flex Ckt
011-00296-01	Svce, GNC300XL, Dspl Module
012-00067-01	Svce, XL Keyboard
012-00092-00	Svce, GNC300 Interface Bd
012-00205-50	Svce,GPS155XL CPU
115-00060-00	SMP, GNC300 Bottom Cover
115-00061-00	SMP, GNC300 Top Cover
125-00009-02	Die Cast Bezel w/Lt Block
125-00027-00	DCP, Coupling Sleeve
145-00056-00	PMP, GPS150 Race
145-00107-02	PMP, Keycap, Lower, Nearest
145-00107-03	PMP, Keycap, Lower, Route
145-00107-04	PMP, Keycap, Lower, Waypoint
145-00107-05	PMP, Keycap, Lower, NAV
145-00107-06	PMP, Keycap, Lower, Message
145-00107-08	PMP,Keycap,Lower,Down Arrow
145-00107-09	PMP,Keycap,Lower,Up Arrow

Table 6-1. Replaceable Parts Con't.

145-00108-01	PMP, Keycap, Upper, Enter
145-00108-03	PMP, Keycap, Upper, Clear
145-00108-04	PMP,Keycap,Upper,Direct to
145-00114-00	PMP, Light Pipe
145-00130-01	PMP, Keycap, Oval, Paint/Ltring
210-00021-00	Nut, Hex, Reduced, M7
211-00030-00	Pivot Pin, Power Switch
211-00037-00	Screw, Set, M3x0.5x2.6mm
212-20004-00	Wshr, Flat, Non-standard, S.S.
212-20011-00	Wshr, Flat, Non-std, Teflon, ID.126
213-00013-00	Spacer, M4 x 4.5mm Long
232-30032-00	E-Ring, Std, Metric, Flat,3.2
233-00017-00	Jack Screw
250-00002-00	Insulator, Rubber, TO-220
250-00035-00	Shoulder Washer
250-00056-00	Shoulder Washer
252-00004-00	Neoprene Spacer, GPS150
253-00014-00	Seal, Light, Keyboard
320-00003-00	15' Low Loss Antenna Cable with Right Angle BNC Connector
320-00003-02	30' Low Loss Antenna Cable with Right Angle BNC Connector
320-00088-00	RG58 10dB cable @ 1.5 GHz
335-00026-01	Rbn Ca Stp,.025" Ctrs,2x13
360-00009-00	Lithium Cell, 3V, PC Mount, 850 mAH
362-00014-00	Wall Charger GNC
430-00002-00	Knob, Cnctrc, Sm w/Trim Ring
430-00013-00	Knob Assy, Illum Skirted, Cnctrc
430-00014-00	Knob, Volume, Lighted
470-00030-00	Lens,GPS155XL TSO

SECTION 7

ASSEMBLY DRAWINGS

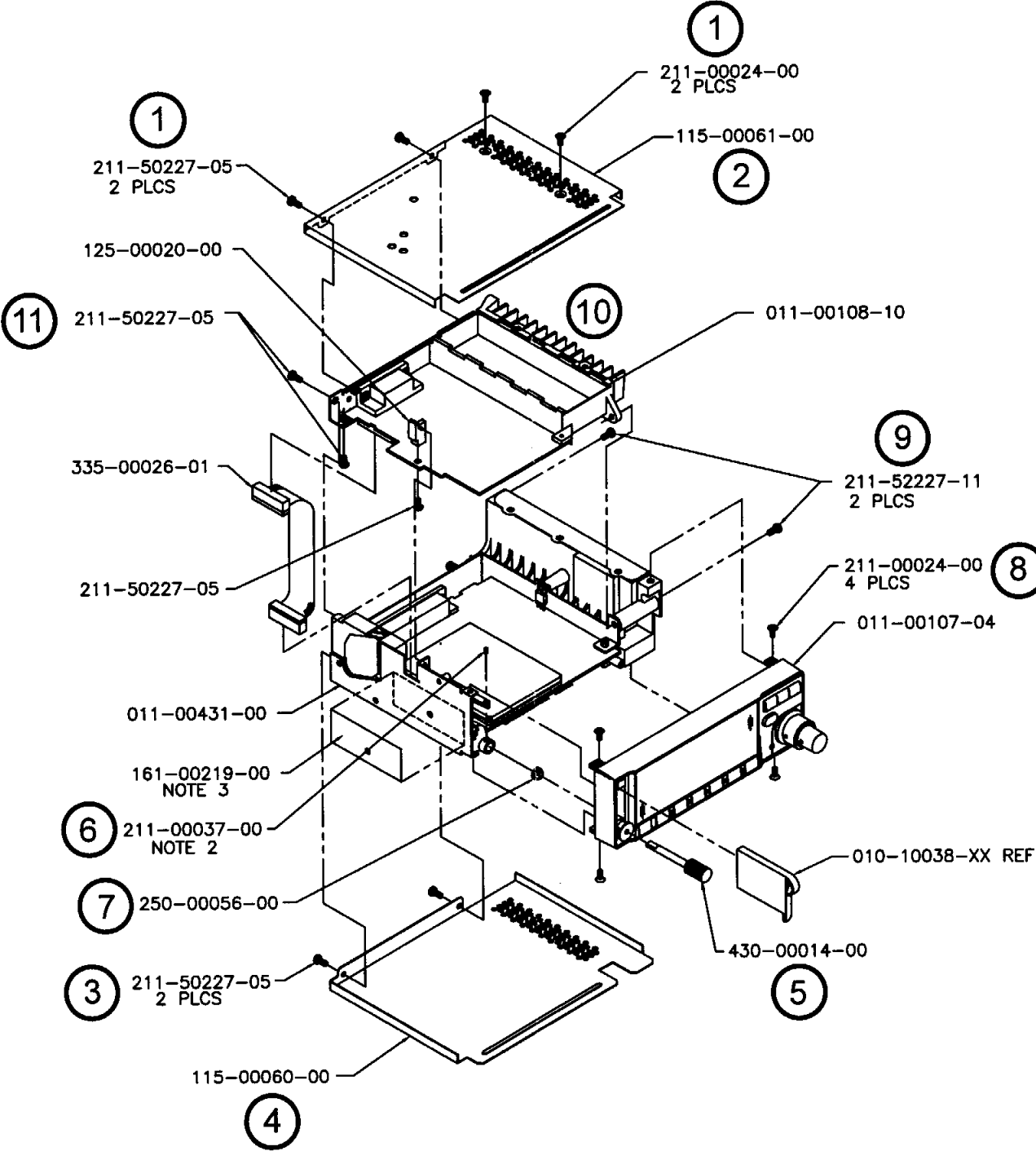
7.1 INTRODUCTION

This section contains assembly drawings for part identification and to aid in assembly and disassembly of the unit. Part numbers are called out in the drawings for reference, not necessarily, ordering purposes. ***The only parts, which are candidates for ordering (replacing), are listed in Table 6-1. Notes are included on the drawings for informational purposes.***

The following drawings are included in this section:

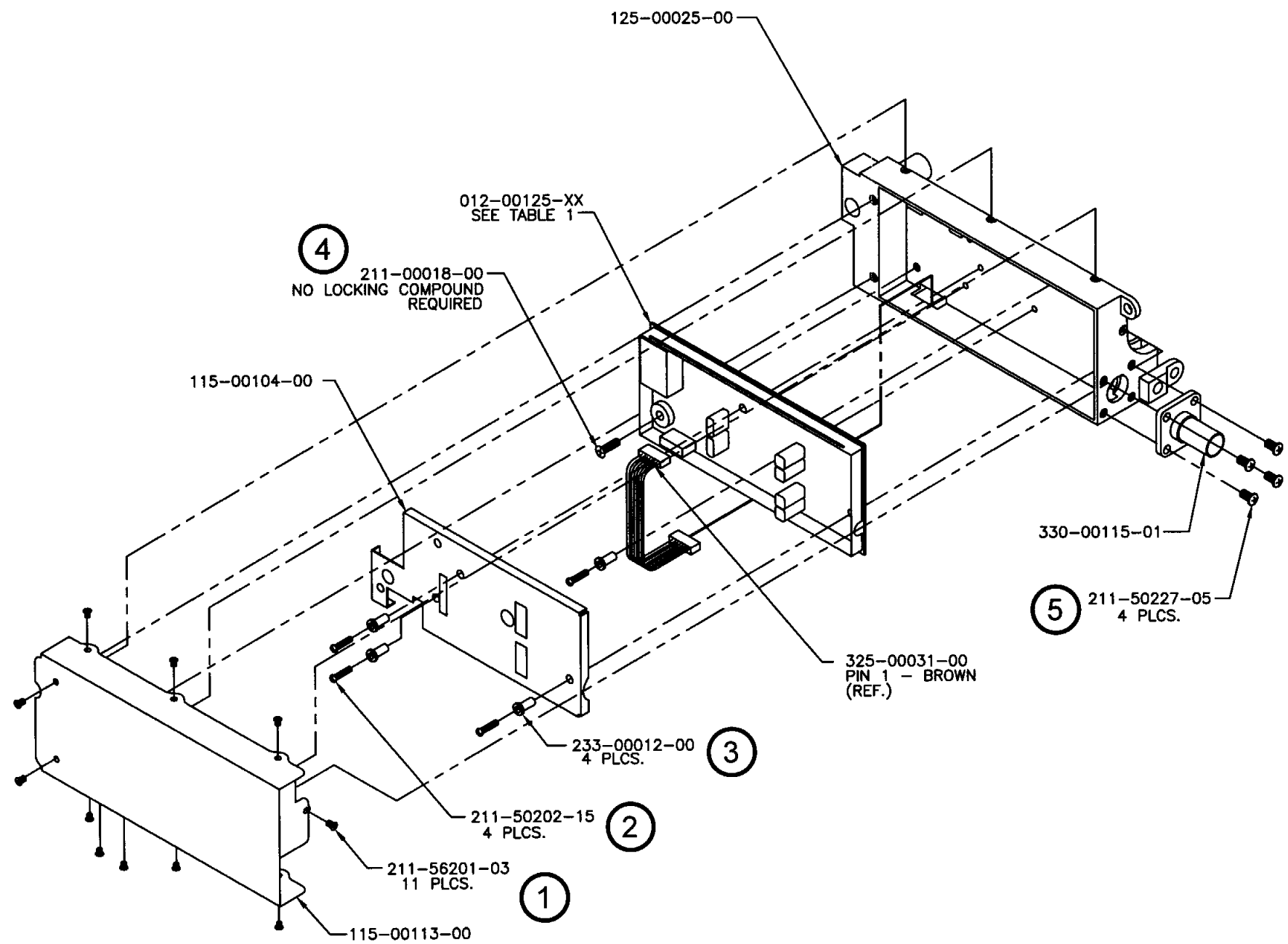
- Figure 7-1—GPS 155XL Assembly
- Figure 7-2—GPS 155XL GPS Receiver Assembly—***For reference only, contains no replaceable parts.***
- Figure 7-3—GPS 155XL Main Chassis Assembly
- Figure 7-4—GPS 155XL CDU Assembly
- Figure 7-5—GPS 155XL Remote Battery Pack

This page intentionally left blank.



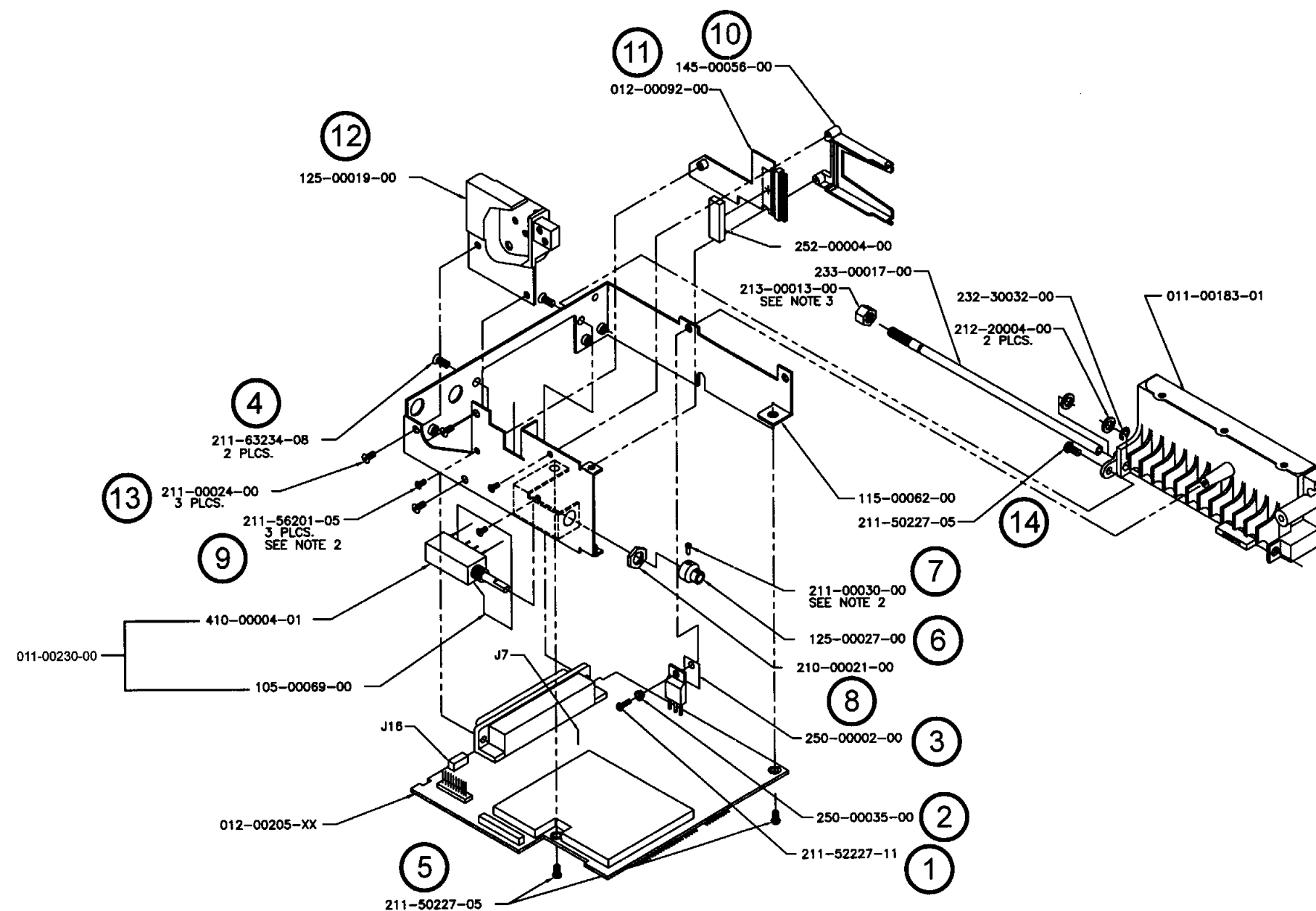
- NOTES:
1. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-00 ON ALL THREADED FASTENERS, TYPE 2, UNLESS OTHERWISE NOTED OR PRE-APPLIED.
 2. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-01 WHERE THIS NOTE IS REFERENCED.
 3. ALIGN HOLE IN TAG WITH COUNTERSINK IN CHASSIS AS SHOWN.

FIGURE 7-1. GPS 155XL ASSEMBLY



- NOTES:
1. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-00 ON ALL THREADED FASTENERS. TYPE 1 UNLESS OTHERWISE NOTED OR PRE-APPLIED.
 2. ASSEMBLY ORDER:
PLACE RIBBON CABLE (325-00031-00) ON PC BOARD (012-00125-00).
PLACE PC BOARD (012-00125-XX) INTO CASTING (125-00025-00) AFTER ROUTING RIBBON CABLE PROPERLY.
MOUNT PC BOARD TO CASTING USING SCREW (211-50202-15) WITH SPACER (233-00012-00) AND NYLON SCREW (211-00018-00).
ATTACH BNC CONNECTOR (330-00115-01) TO CASTING USING SCREWS INDICATED. SOLDER BNC CONNECTOR LEAD TO PC BOARD.
SLIDE GPS RCVR COVER (115-00104-00) OVER PC BOARD SHIELD AND SECURE BY USING REMAINING SPACERS AND SCREWS (211-50202-15).
PLACE COVER (115-00113-00) OVER CASTING AND SECURE USING SREWS INDICATED.

FIGURE 7-2. GPS 155XL GPS RECEIVER ASSEMBLY



NOTES:

1. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-02 ON ALL UNLESS OTHERWISE NOTED OR PRE-APPLIED.
2. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-01 ON THREADED FASTENERS WHERE THIS NOTE IS REFERENCED.
3. APPLY THREAD LOCKING COMPOUND PER GARMIN SPEC. NO. 001-00048-04 ON P/N 233-00017-00 BEFORE PUTTING ON 213-00013-00.

FIGURE 7-3. GPS 155XL MAIN CHASSIS ASSEMBLY

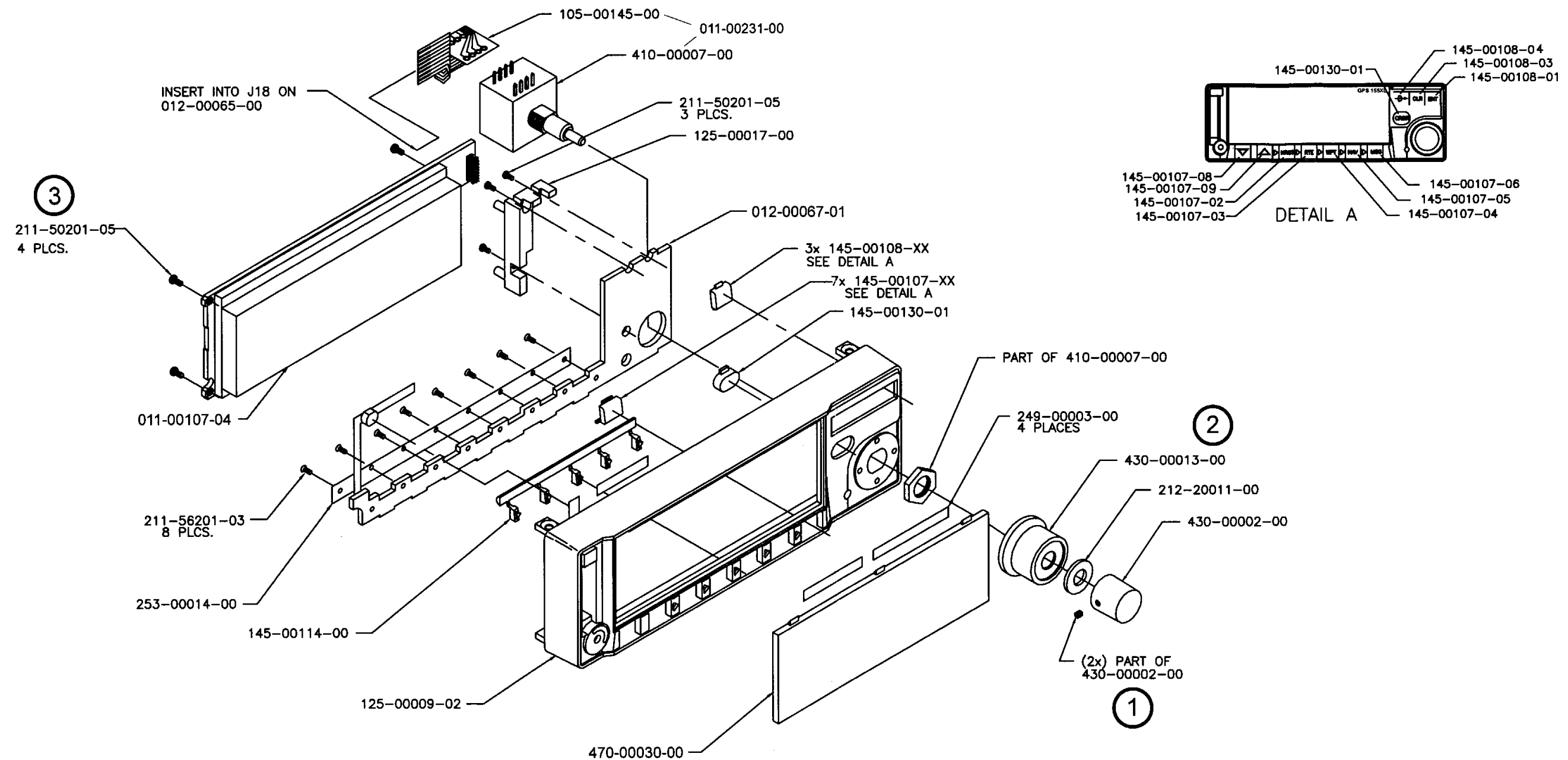


FIGURE 7-4. GPS 155XL CDU ASSEMBLY

